

REMARKS

Reconsideration and withdrawal of the rejections set forth in the Office Action dated 6 May 2003 are respectfully requested. The applicant petitions the Commissioner for a three-month extension of time; a separate petition accompanies this amendment.

I. Amendments

The present amendment amends claim 1 and claim 5. Upon entry of the present amendment, claims 1-7, 9, 10, 13, 14, 16, and 17 will be pending in the application.

II. Rejections under 35 U.S.C. § 112, second paragraph

The Examiner rejected claims 1-7 as indefinite under the second paragraph of 35 U.S.C. §112. The undersigned continues to disagree with the Examiner's position. In the interest of advancing prosecution and placing the claims in better condition for purposes of appeal, though, claims 1 and 5 have been amended to specifically recite the electrolyte.

III. Rejections under 35 U.S.C. § 103

A. The Applied Art

The Examiner combines several unrelated and contradictory to references reject each of the pending claims. In particular, the Examiner's rejections are all predicated on a combination of U.S. Patent No. 5,078,852 ("Yee") with at least two of U.S. Patent No. 5,723,028 ("Poris"), U.S. Patent No. 4,118,301 ("Mayer"), and selected excerpts from a book entitled *Electroplating* ("Lowenheim").

Yee suggests a plating holder in which each of several cam assemblies 16 engages a surface of a wafer with a cam 28. If the cam 28 were formed of the same material being electroplated, it would be attacked during a subsequent etch-back procedure. Yee gives one specific example in which copper is electroplated on the wafer and notes that the cam 28 must be made of a different material "such as titanium so that electroplated metals such as copper can be etched back without attack of the cam." (Column 4, lines 18-20.)

The Examiner appears to rely on Poris solely as acknowledging that copper, silver, and gold can be electroplated on semiconductor materials. The Examiner relies

on Lowenheim as disclosing "that it is known to electroplate gold onto electrical devices because of its good electrical contact properties, corrosion resistance, and because it will not 'poison' semiconductor materials." (Page 5 of the 6 May 2003 Office Action in this application.)

The Examiner also relies on Mayer in rejecting some of the claims. Mayer illustrates an electrofinishing system for stainless steel cutlery. The cutlery may be held in place during electrofinishing by a clip 68 that may include a copper sleeve 80 (Figure 6) corrodes very slowly compared to the stainless steel being depleted in the electrofinisher.

B. Claims 1-7, 13 and 14 Are Patentable Over the Applied Art

Claim 1 calls for an apparatus for use in electroplating a metal, which is principally comprised of a metal X, onto a wafer. This apparatus includes, among other things, at least one electrode having a contact face that is adapted to engage a surface of the wafer to conduct electrical current thereto. The surface of the wafer is engaged at a portion of the contact face that has been pre-coated with a metal layer that is principally comprised of the metal X.

In the current case, the Examiner assembles a hypothetical combination of materials for use with Yee's plating rack. As currently understood, the logic is that Yee shows an electroplating system that employs cams; Poris mentions that one can electroplate gold on semiconductor materials; and Lowenheim notes that gold deposited on a semiconductor has good electrical properties; ergo, it would have been obvious to use an inert gold cam 28 in Yee to deposit a gold coating on the wafer held by the cams.

This rejection falls short of the MPEP's minimum requirements for an obviousness rejection under 35 USC §103. After stating that "The examiner bears the initial burden of factually supporting any *prima facie* conclusion of obviousness." (MPEP § 2142, 8th Ed., Revision 2, May 2004), the MPEP identifies three requirements to meet this burden: 1) there must be a suggestion or motivation to modify or combine the references as the Examiner suggests; 2) there must be a reasonable expectation that such modification or combination will succeed; and 3) the combined teachings must

teach or suggest every one of the claim limitations. *Id.* The MPEP also clarifies that "The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure." *Id.*

The MPEP warns against specious reliance on hindsight to gloss over differences between a claimed invention and the applied art, explaining that the "fact that the claimed invention is within the capabilities of one of ordinary skill in the art is not sufficient by itself to establish *prima facie* obviousness." (MPEP § 2143.01.) The Examiner is also admonished against combining references in a fashion contrary to the intended use or principle of operation of any of the references:

- If the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious. *Id.*
- If [a] proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. *Id.*

In response to the prior Office Action, which relied on the same combination of references, the undersigned argued there is no suggestion or motivation to combine the references in this fashion. The Examiner addressed this concern by contending that the combination would yield "the desirable properties such as improved electrical contact and avoidance of poisoning the semiconductor workpiece which would have been obtained as taught by Lowenheim." The undersigned still does not see how Lowenheim's bromides regarding the electrical properties of gold would lead to this combination.

Even if the proposed combination of references would otherwise be proper, the Examiner's argument still has a fatal flaw. The Examiner focuses on Yee's use of titanium for the cams 28 and argues that gold would perform the same function because it is "inert." In doing so, the Examiner overlooks Yee's primary concern in this regard –

longevity of the cams 28 during etching. If gold cams were used to deposit a layer of gold, the cams would be just as subject to etching during an etch-back process as is the layer of gold deposited on the wafer. Hence, the Examiner's proposed combination is directly contrary to Yee's principle of operation in this regard. The Examiner's proposed modification would also make the cams 28 unsatisfactory for their intended purpose because they would be ravaged by the etch-back process. As explained above, the MPEP specifically admonishes against any combination of references that would change a reference's principle of operation or render it unsatisfactory for its intended purpose. Claim 1, therefore, is allowable over the applied art, as are dependent claims 2-4.

The Examiner relies on the same ill-considered combination of references and the same basic logic in rejecting claims 5-7, 13, and 14. Consequently, claims 5-7, 13, and 14 are also patentable over this combination of references.

C. Claims 9, 10, 16 and 17 Are Patentable Over the Applied Art

Claim 9 recites a wafer holding assembly for use in electroplating apparatus used to plate copper onto a wafer. This assembly includes at least one electrode having a contact face that is adapted to engage a surface of the wafer to conduct electrical current thereto. The contact face is pre-conditioned prior to contacting the wafer by electroplating a copper-containing layer thereon using the copper-containing electrolyte. In rejecting claim 9, the Examiner relies on the same miscombination of Yee, Lowenheim, and Poris and further points to a copper collar on a spoon clamp in Mayer's stainless steel electrofinishing system.

The Examiner's reliance on Mayer actually highlights the deficiencies of the combination of Yee, Poris, and Lowenheim. Yee actually gives an example in which copper is electroplated on the wafer, but specifically teaches that the cam 28 must be formed of a different material so it will not be attacked when the copper is etched back. Like Yee, Mayer selects a material for a holding device (the copper sleeve 80 of the clip 68) that differs from the workpiece (the stainless steel cutlery) so it can better withstand chemical processing of the workpiece.

Thus, the Examiner's rejection of claim 9 suffers from two defects. First, Yee specifically says that, when electrodepositing copper, the cams 28 must be formed of a different material. Second, Mayer, which the Examiner relies on as showing the use of copper in a holding clip, reinforces the teaching that a workpiece must be held by a holder that is formed of a different material. In claim 9, the contact face, which is adapted to engage a surface of a wafer to be plated with copper, includes a copper-containing layer. Yee and Mayer teach away from such a structure.

Hence, claim 9 is patentable over any defensible combination of Yee, Poris, Lowenheim, and Mayer. Claim 10 depends from claim 9 and is patentable at least by virtue of that dependency. The Examiner's rejection of claims 16 and 17 relies on the same faulty logic in combining Yee, Poris, Lowenheim, and Mayer. As a result, claims 16 and 17 are also patentable over the applied art.

V. Conclusion

In summation, the claims pending in the application comply with the requirements of 35 U.S.C. § 112 and patentably define over the applied art. A Notice of Allowance is, therefore, respectfully requested. If the Examiner has any questions or believes a telephone conference would expedite prosecution of this application, he is encouraged to call the undersigned at (206) 359-8000.

Respectfully submitted,

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